Physics Department Incidents Log

Incident No.	2006 - 02	**Date of Report:** 9/5/06
Reportable/Classification:	Not Reportable	**Date of Incident:** 6/22/06
Status	ES&H Final Report	
Groups Involved:	OMEGA	
Lead Investigator:	J. Kierstead	

Description:
On Thursday, June 22 there was an event in the low voltage power supply testing laboratory, Room 1-85. It was discovered that an electrical connection of a product from Modular Devices Inc. was glowing incandescently. The power to the power supply was shut off and it was cooled down. Work was halted immediately until the event could be evaluated.

Background

This laboratory is used for testing power supplies manufactured by Modular Devices Inc. and intended for use in LAr in ATLAS at CERN. The total output power for each supply is approximately 3 kilowatts spread among 7 voltages. The input voltage is 280 volts DC at about 12 -13 amps maximum. As part of the process of qualification these supplies are tested and burned in for a period of approximately 1 week. To meet the testing requirements the supplies are operated continuously for about a week. Generally, the laboratory is occupied or visited often during working hours but is not checked at night or on weekends. These supplies are water cooled and equipped with temperature sensors for external readout and an internal thermal switch that shuts the supply down in case of over temperature (60 °C). In addition, the temperature of the supply is monitored by computer and the 280 volt supply is shut down if the supplies under test exceed a selected temperature (usually 52-54 °C).

Details of Failure

The power supply that had the problem was SN 3005, B/C 126682. It was mounted on burn-in station #3 on 6/16 and connected to an output load of the same size as that required at CERN. Initial measurements of voltage, current and ripple were made on the unit to establish a baseline. On 6/22 the connection on the 280 volt DC input connection was observed to be red hot. After the event the power was turned off, and the connection was inspected. It was observed that the nut securing this connection was loose. This would make the resistance in the connection larger and could account for the heating. This connection is inside the supply and is not normally visible during the burn-in process. In this instance the chassis had been removed and replaced with a Plexiglas cover with holes over trim pots used to adjust the voltage values. This cover allows these adjustments of the voltages to be performed safely.

Analysis

This power supply that feeds this connection has a maximum current of 16 amps and is generally current limited to 14 amps. In addition, when the voltage supplied to the power supply drops to 240 volts or less some of the supply will shut down. There is no indication that this happened. The maximum power that could have been dissipated in this connection is 40V x 14 amps or 500-600 Watts.

Root Cause: **A2 Equipment / Material Problem**
B3 Inspection / Testing Less Than Adequate
C02 Inspection / Testing Less Than Adequate

Manufacturer's inspection process should have included ensuring the nut was adequately tightened.

Contributing Causes: **None**

Corrective Actions (Group): Abatement of Hazard

There are several things that can be done to abate this hazard. First, it is not believed that this is a safety hazard if the supply chassis is closed up. Although you might get excessive heat it is enclosed in a metal box. The hazard occurs when the chassis cover is off. We propose to reduce the hazard by:

1) Reducing the amount of time the cover is removed. The power supply needs to be burned in with the cover removed for at least 24 hours to allow time for components that change values with burn-in to go to stop changing. After this the chassis can be restored.

2) Checking the hardware on connections with high current. This can be done on receipt of the supply when the cover is first removed.

3) Removing flammables from near the supply. The major issue here is the table surface under the supply. We can use a temporary shield to protect the wood from catching fire or being damaged in case of a similar incident.

In addition, the manufacturer will be made aware of this problem and asked to address it
(Completed 6/28/06 – Manufacturer's QA Manager sent email message below)

> I have spoken to both operators concerning the loose 280v connection of model 53472. Effective immediately, after final test and prior to cover, an inspector will be called to verify the tighness of the 280v hardware. The inspector will note on the Test History Traveler, that the hardware has been verified.
>
> Linda Zakrewski
> Modular Devices Inc.
> 1 Roned Road
> Shirley, New York 11967
> 631-345-3100

Corrective Actions (Department):

Discuss this event with the electrical QA representative in the Physics Department to see if he concurs with the analysis and corrective actions. (Spoke with Bob Scheetz who inspected, reviewed, and approved – Completed 6/26/06)

Group Safety Coordinators (GSCs) will be informed and there will be discussion of this incident at the next GSC meeting, Group Leaders and the Department will be informed of the incident at the next Department Meeting.

Lessons Learned: **None**

The above incident has been investigated and requires no further action.

S Dawson — 9-20-06
S. Dawson, Department Chair — Date

Brad M. Johnson — 9-18-06
B. Johnson, ES&H Committee Chair — Date